

types. Of these cryptogams none are better known than the ferns and the mosses, and as the reader of Hofmeister's work, or, as we are but too glad to be able to add, of most of the very recent handbooks of botany, well know, both of these groups have this in common—that they pass, as it were, through two existences, one of which we may call the "fruit-bearing" stage (the sexual stage), and the other the "spore-bearing" stage (the a-sexual stage). The former of these two is the stage so apparent to us all in flowering plants, where, as a product of the fertilisation of the contents of the carpel by the pollen from the stamens, we have the fruit. In the ferns, as a rule, this first stage is one in which the plant, as it were, thinks only of producing its male and female cells, and the growth of the plant is lost in the care which it takes to continue the species. Shake a spore from the frond of some immense tree-fern, let it germinate, and the plant which will grow thereout will be a little green thing not so big as the top of one's thumb; but it will form its "archegonium" and its "antheridium," and the contents of the latter fertilising the contents of the former, the result will be a plant which in time will equal the large tree-fern in size, but which at this, its great vegetative stage, will never produce aught but spores. In the mosses this state of things is different. The moss-stems which we gather as objects of beauty or use, these are the fruit-producing stages; these concern themselves with growth as well as with what is usually antagonistic to growth, reproduction; and in the second stage, which in the ferns is the only one popularly known, we have but a short-lived, small-sized, spore-producing plant, sometimes quite hid away in the lovely foliage of the moss plant, sometimes starting up from it, and then known popularly as its fruit, but really only its spore-producing stage. It is only very recently that Dr. Karl Goebel (*Botanische Zeitung*, October, 1877) has called attention to the development of the prothallium (sexual stage) of a delicate little fern called *Gymnoogramme leptophylla*, which is to be found in Jersey, along both shores of the Mediterranean, and probably in all suitable localities in Africa, Asia, Australia, and South America. It and a few other species are annuals, so that at once we see that their a-sexual stage, which is also their vegetative one, is quite limited. Moreover, their little stems are often not more than an inch in height and the texture of the frond is almost pellucid. It thus approaches the mosses in the feebleness of this stage; but the most interesting fact brought to light by Dr. Goebel is that the sexual stage, generally in the ferns so evanescent, is here absolutely somewhat long-lived, and more, that it is even somewhat vegetative, something like that of *Anthoceros levis*. Such a form, which makes a bridge to thus connect the two groups (ferns and mosses), is of great importance, and Dr. Goebel's memoir, which is illustrated, is not only of great value from the accuracy of its details and from his deductions therefrom, but also as showing how much can be done even with apparently well-known forms.

PROF. GRIMM ON THE FAUNA OF THE CASPIAN.—We notice the appearance of the second part of Prof. O. A. Grimm's (Russian) work on the Aralo-Caspian Expedition. It is devoted exclusively to the Caspian and to its fauna, and contains the description of worms, sponges, and molluscs, discovered during the expedition, together with a general sketch of the vertical and horizontal distribution of Caspian molluscs. Prof. Grimm divides them into three regions, out of which the lowest one (deep sea) corresponds to older forms of fossils, whilst the upper one has its nearest relatives in youngest forms of fossils. In a concluding chapter Prof. Grimm discusses the interesting question as to the influence of conditions of life on morphological structure, and shows by many illustrations the accommodation of forms to varied conditions at different depths. The work is illustrated by many drawings.

TRANSFORMATION OF CARTILAGE INTO BONE.—The last *Bulletin* of the Belgian Academy of Sciences (vol. xliv. No. 11) contains a very valuable paper of Dr. Leboucq, Superintendent of Anatomical Researches at the University of Ghent, on the mode of formation of the bone tissue in the long bones of mammals, in which the author discusses and resolves by his researches, based on a new principle, the much-debated question whether the embryonal cartilage is substituted by a new tissue, or is directly transformed into a bone. The great difficulty of rendering the minute cartilage cells apparent among other cells, is resolved by the author by his employing soda, and decalcifying the sections with acidulated glycerine; the cells thus preserve their shape, and receive a beautiful colour, as is seen from a chromolithographed plate accompanying the paper. By using this method the author was enabled to prove that the minute cartilage cells take an active part in the formation of bones, quite performing the part of osteoblasts. The researches were carried out in the Ghent Laboratory, under the direction of Prof. van Bambecque, and the paper is accompanied by a very favourable comment thereon by Prof. van Beneden.

OWLS.—M. Alphonse Milne-Edwards has recently read before the Academy of Sciences of Paris two ornithological papers of interest. One on the affinities of the Owl, *Pholidus badius*, demonstrates, from its skeleton, that it belongs, quite contrary to the general opinion of naturalists, to the Bubonidae, near to *Syrnium* and *Nyctale*, and not to the Strigidæ. In the species the posterior margin of the sternum has two pairs of well-developed notches, and the furcula is not complete at its symphyseal extremity. This being the case, the genus *Strix* is now the only member of the family of the Strigidæ, and the pectination of the inner edge of the nail of the third toe found in it is no longer to be taken as of much importance in the group. In the second paper a new genus of Strigine Owls is described, from Madagascar, and named *Heliodilus*.

ALGAE OF THE WHITE SEA.—At a recent meeting of the St. Petersburg Society of Naturalists, M. Chr. Gobi read an interesting paper on the algæ of the White Sea. The number of species he has discovered reaches seventy, of which ten are green algæ, six *Fucus*, and twenty-nine red algæ. The algæ of the White Sea are a mixture of representatives of the Arctic and of the Atlantic basins, as well as of fresh water and salt water forms, the mixed characters of the flora being especially obvious with respect to the green algæ.

GEOGRAPHICAL NOTES

LAPLAND.—An important exploration of Russian Lapland is being carried out by the Swedish lieutenant Sandeberg. Hitherto only the coast of the region has been known with anything like accuracy, the interior features being set down solely from conjecture. Lieut. Sandeberg commenced his work in 1876, and we learn from the *Geographische Blätter* (Heft 1, 1878) of the Bremen Society, it will be continued till 1880. The country will be carefully explored and accurate observations taken, which will enable Lapland to be at last mapped satisfactorily. Lieut. Sandeberg is accompanied by several zoologists who are investigating minutely both the mainland, island, and sea fauna, and have already made considerable additions to our knowledge in this direction. During the last two summers Sandeberg has found seventy-eight new species of birds in the Kola peninsula, of which one at least is stated to be quite new to science. Large collections in other departments have also been made. Previous to Sandeberg, no educated European has explored Russian Lapland, which is of such great importance to the zoologist,

geologist, botanist, and archaeologist. Among other finds it may be mentioned that near Golotizk, on the east coast of the White Sea, he found a great ancient manufactory of flint implements of the stone age, of the purest and highest Scandinavian forms, which previously had been seldom found east of the Baltic, and never on the coast of the Arctic Ocean or the White Sea. The collections will be divided between the State Museums of Russia, Sweden, and Norway, all three countries affording facilities for the conduct of the expedition.

CHINA.—In accordance with the terms of the Chefoo Convention, Her Majesty's minister at Peking, about a year ago, sent to Chung-king, in the Chinese province of Szechuen, which lies at the junction of the River Ho-tow with the Yang-tsze Kiang, Mr. E. Colborne Baber, of her Majesty's Consular Service, who was one of the interpreters attached to the Yünnan mission, and who, before proceeding on that bootless errand, was at considerable pains to qualify himself for scientific exploration. Mr. Baber started last July on an expedition in the western districts of the province. But little was heard of Mr. Baber's doings until the end of the year, except from a private letter in which he described himself as floating down the River Min, among low hills covered with fir and insect wax trees, and in sight of (though at a distance of sixty miles on the south-west) the holy mountain of Omi, on the borders of Thibet. On December 27 the *North China Herald*, of Shanghai, published a portion of another letter from Mr. Baber, in which he mentions that, from the point just named, he made north-west and from Ya-chow began to veer south. Passing Ning-yüan-foo he went to Hwa-li-chow; then turned east and crossed the Yang-tsze into Yünnan, not far from Tung-chwar. Thence through the wildest and poorest country imaginable, the great slave-hunting ground from which the Lolas carry off their Chinese bondsmen—a country of shepherds, potatoes, poisonous honey, lonely downs, great snowy mountains, silver mines, and almost incessant rains, Mr. Baber tracked the course of the Upper Yang-tsze to Ping-shan. No European, he says, has ever been in that region before, not even the Jesuit surveyors, and the course of the Yang-tsze, there called the Gold River (Kin-sha Kiang), as laid down on their maps, is a bold assumption and altogether incorrect. Mr. Baber adds that "a line, drawn south-west from a mile or two above Ping-shan, will indicate its general direction, but it winds about among those grand gorges with the most haughty contempt for the Jesuits' maps."

MOUNT TONGARIRO.—The celebrated burning mountain of New Zealand, Tongariro, has at last been explored by an Englishman, Mr. P. F. Connelly. The volcano is regarded as *tapu*, or sacred, by the Maoris, who have hitherto resisted all attempts to explore the mountain on the part of the colonists. The volcano is situated nearly in the centre of North Island, and though only 6,500 feet high, is less accessible than either Mount Edgecumbe or Ruapehu, both of which exceed 10,000 feet in height. Mr. Connelly overcame all resistance, and by the help of some chiefs more friendly than the rest, succeeded in thoroughly exploring the crater, took a number of sketches and photographs of the locality, and determined the positions of the most important peaks.

AFRICAN EXPLORATION.—The King of the Belgians has sent to M. Quatrefages a telegram stating that two other Belgian officers should proceed to Zanzibar within a few days, to supply the places of the unfortunate MM. Crespel and Maes, whose death we announced last week. Telegraphic orders have been sent to the remaining members of the expedition to continue their journey to Tanganyika. The Paris Geographical Society, anxious to acknowledge such a determined policy, have resolved to take steps to accelerate the public subscription instituted on behalf of international African exploration. It

has been resolved also to establish a local committee on a very large scale; not less than a hundred persons of distinction will be selected, with power to add to their number.

PARIS GEOGRAPHICAL SOCIETY.—The distribution of prizes will take place not in April, as usual, but at the meeting to inaugurate the Society's hotel, now building. It will be ready in the month of September or October next. The gold medal will be awarded, as already reported, to Mr. Stanley, but another gold medal of the same value will be given to the veteran M. Vivien de Saint Martin, the celebrated geographer, for the many valuable works published by him during the last thirty years, and principally "L'Année Géographique."

AMERICAN GEOGRAPHICAL SOCIETY.—We have received two numbers of the *Bulletin* of this Society, containing the proceedings of the meetings for the first half of 1877. One number is devoted to the admirable summary of geographical work for 1876, which constituted the address of the President, Chief Justice Daly, and to which we alluded at the time. In the other number (No. 4) the principal paper is on the volcanoes of the U.S. Pacific coast, by Mr. S. F. Emmons.

MAPS OF THE SEAT OF WAR.—The Russo-Turkish war has called forth a very large number of maps of the Balkan peninsula. We learn that a Russian gentleman has made a collection of maps of the seat of war, numbering more than 150, and will exhibit the collection at Paris. The largest number of such maps has been published in Germany, and the most detailed maps appear to be those published in Finland.

ARCTIC EXPLORATION.—Mr. James Gordon Bennett has petitioned the U.S. Congress to grant the American register to the steamer *Pandora* for an Arctic expedition under the command of American naval officers.

SOCIAL ELECTRICAL NERVES¹

THE efficient carrying out in a large city of any extended system of telegraphic communication for police, fire, and social purposes demands an intimate acquaintance with existing systems, so as to insure the establishment of only the most perfect organisation. In an ordinary telegraphic communication between two or more stations a line wire connects the terminal station with the instruments in the circuit, and the distant end of this wire is in connection with the earth, while the other end, after connection through the instrument, passes to one pole of a battery, the other pole of which is also in connection with the earth. Thus the electrical circuit is completed partly by the line wire and partly by the earth wire. Such is an ordinary circuit. At times when telegraphic communication is required only for short distances, as in houses and buildings, a second wire takes the place of the earth circuit. In the auto-kinetic system for the introduction of fire, police, and social telegraphs upon an extended scale an essential feature is the employment of two parallel wires, laid over a city and suburbs, starting from a central station to the various district stations, and from thence ramifying in every direction so as to embrace the most important areas for the purposes required. Each of these two wires has its special duty to perform. One is employed for the purpose of starting the instrument, which may therefore be termed the "starting" wire. The other is used for the transmission of the message, and may be termed the "transmitting" wire. It is by this novel arrangement that the auto-kinetic system enables any number of speaking stations to be placed upon a circuit without possibility of interference. Thus in each district of a

¹ Continued from p. 306.